Anterior Circulation Large Vessel Occlusion Prognosis

- Association Between Early Spontaneous Post-Thrombectomy Blood Pressure Reduction and Clinical Outcomes in Large Vessel Occlusion Stroke
- Predictors of futile recanalisation in patients with large infarct: a post-hoc analysis of the ANGEL-ASPECT trial
- Integrating perfusion imaging derived venous outflow and tissue-level collateral parameters in a comprehensive clinical model enhances prognostication in large vessel occlusion stroke
- Validation of the HERMES-24 Score for Outcome Prediction Post Large Vessel Occlusion Treatment in Later Time Window
- The risk of endovascular thrombectomy in acute ischemic stroke patients with large vessel occlusions harboring unruptured intracranial aneurysms
- Sex-based differences in inflammatory predictors of outcomes in patients undergoing mechanical thrombectomy: an inverse probability weighting analysis
- Safety and efficacy of rescue endovascular treatment in ischemic stroke patients with early neurological deterioration caused by large vessel occlusion
- Imaging-Based Brain Frailty Predicts Unfavorable Outcomes in Acute Ischemic Stroke

Anterior circulation large vessel occlusions (LVOs) typically involve the **internal carotid artery (ICA)**, the **M1 segment of the middle cerebral artery (MCA)**, and sometimes the **anterior cerebral artery (ACA)**. These occlusions carry high morbidity and mortality due to the large brain territory affected.

Prognostic Factors

Time to Reperfusion

- **“Time is brain”**: Earlier reperfusion is directly linked to better functional outcomes.
- Every 30-minute delay reduces the chance of independence at 90 days (mRS ≤ 2).

Collateral Circulation

- Assessed with CTA or perfusion imaging.
- **Good collaterals**:
    1. Smaller infarct core
    2. Slower infarct growth
    3. Better response to thrombectomy
- **Poor collaterals**:
    1. Rapid infarct expansion
    2. Higher risk of hemorrhagic transformation
    3. Worse prognosis

Baseline Infarct Core Volume

- Measured with CT perfusion or DWI MRI.
- **< 50 mL**: better outcome
- **> 70 mL**: worse prognosis, though some may still benefit from thrombectomy (e.g., SELECT2 trial)

NIHSS Score

- Reflects initial stroke severity.
- **NIHSS ≥ 16** suggests severe stroke, but good outcomes are still possible with reperfusion.

Recanalization Success (TICI Score)

- **TICI 2b–3**:
    1. Strongly associated with good outcomes
    2. Lower mortality and disability
- **TICI 0–2a**:
    1. Poor outcome even with early intervention

Age and Comorbidities

- Older age (>80 years) and comorbid conditions (e.g., atrial fibrillation, diabetes) reduce the likelihood of functional independence.

Location of Occlusion

- **Carotid-T** occlusions: worse prognosis than M1 occlusions
- **Tandem occlusions** (cervical ICA + MCA): even higher risk of poor outcomes

Outcome Statistics with Thrombectomy

- **Functional independence (mRS 0–2 at 90 days)**: ≈ 45–55% with successful reperfusion
- **Mortality**: ≈ 15–20%
- **Symptomatic intracerebral hemorrhage**: ≈ 5–7%

Long-Term Considerations

- Prognosis varies with hemisphere affected (dominant vs non-dominant).
- Common sequelae:
    1. Aphasia
    2. Hemiparesis
    3. Neglect

4. Apraxia
- Long-term rehabilitation is essential for functional recovery and reintegration.

Retrospective cohort studies

In a retrospective cohort study Asimos et al. from Atrium Health, Charlotte (Emergency Medicine, Neurosciences Institute, Quality Analytics, Radiology, Neurosurgery, Neurology) published in the Interventional Neuroradiology Journal to assess whether hypoperfusion intensity ratio (HIR) and cerebral blood volume index (CBVI) measured via CT perfusion at referring non-thrombectomy centers predict favorable 90-day outcomes post-transfer for thrombectomy in anterior circulation large vessel occlusion (ACLVO). CBVI—as a continuous measure and specifically > 0.7—correlated with functional independence (mRS ≤ 2) at 90 days both overall and in recanalized patients. In contrast, HIR thresholds and combined collateral scores were not predictive [1].

Critical Review

Strengths

Excellent sample size (n = 497), with high treatment prevalence (93% thrombectomy) supporting real-world relevance.

Rigorous adjustment for confounders in multivariable models enhances validity.

Weaknesses

Retrospective and single-center design at a large referral system may limit external generalizability.

No direct comparisons to other perfusion metrics like Tmax or ischemic core volumes—makes it difficult to situate CBVI within broader CTP prognostication tools.

HIR binary thresholds (0.4–0.6) may lack granularity; their univariate non-association could stem from arbitrary cutoffs rather than biological irrelevance.

Unclear reproducibility or inter-observer reliability of CBVI quantification across centers or software versions.

Statistical note

Adjusted OR of 1.73 for CBVI > 0.7 is clinically meaningful, but confidence interval (1.13–2.65) suggests moderate precision.

Final Verdict

Rating: 6.5 / 10

Takeaway for practitioners: CBVI from CT perfusion at referring centers could offer a pragmatic predictor of functional independence after thrombectomy, especially when > 0.7. However, its standalone prognostic value remains uncertain until validated prospectively and benchmarked

against established perfusion metrics.

Bottom line: CBVI appears promising as a simple, transportable predictor of favorable outcome in ACLVO, but further multi-center, prospective validation and comparison studies are needed before adoption into routine transfer decision-making.

Categories: Retrospective Studies, Stroke Imaging, Thrombectomy Outcomes

Tags: CT perfusion, CBVI, HIR, collateral perfusion, stroke prognostication, thrombectomy, anterior circulation LVO

1)

Asimos AW, Yang H, Strong D, Teli KJ, Clemente JD, DeFilipp G, Bernard J, Stetler W, Parish JM, Hines A, Rhoten JB, Karamchandani RR. Association of hypoperfusion intensity ratio and cerebral blood volume Index with good outcome in patients transferred for thrombectomy. Interv Neuroradiol. 2025 Jul 10:15910199251352046. doi: 10.1177/15910199251352046. Epub ahead of print. PMID: 40638076.